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FORMULATION AND EVALUATION OF ETHANOLIC PLANT EXTRACT OF BOERHAVIA DIFFUSA HERBAL FACE WASH

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1. INTRODUCTION

1.1 FACE WASH

A. DEFINITION

A cleanser is a type of facial care product used to rid the skin of impurities such as oil, grime, dead skin cells, and makeup. This aids in pore opening and guards against skin disorders like acne. When combined with a toner, a cleanser can be used as part of a skin care routine to offer both clean and moisturized skin.

1.1 CATEGORIES OF THERAPEUTIC AGENTS USED IN FACE WASH

A. ANTIBACTERIAL

Through their ability to prevent bacteria from growing on the skin, antibacterial cleansers help to enhance skin cleanliness. These mixtures, especially the antibacterial face Washes are important for preventing skin outbreaks and minimizing acne in addition to being efficient at clearing the surface of the face of contaminants. People with oily or greasy skin types, who are more susceptible to certain dermatological disorders, will particularly benefit from these advantages.

B. ANTI ACNE

Acne cleansers work very well at removing extra sebum without drying out your skin.

C. ANTI-INFLAMMATORY PROPERTIES

It is a feature of a drug or therapy that lowers edema or inflammation. About half of analgesics are anti-inflammatory medications, which treat pain by lowering inflammation rather than by blocking pain signals to the brain through the central nervous system like opioids.[1]

1.2 ADVANTAGES OF HERBAL COSMETIC OVER SYNTHETIC COSMETIC

Since natural products give the body nutrients, improve health, and give satisfaction because they are free of synthetic chemicals and have comparatively fewer side effects than synthetic cosmetics, they are becoming more and more popular. Today, the majority of women choose natural products over chemicals for their personal care to enhance their beauty.

A. COMPATIBLE WITH ALL SKIN TYPES

All skin types can use natural cosmetics. There are natural cosmetics like foundation, eye shadow, and lipstick that are suitable for all skin tones, regardless of how lighter or darker you are. The primary issue with particular coal tar colors is that they can cause cancer, as coal tar is known to be a human carcinogen.

B. WIDE SELECTION TO CHOOSE FROM

Numerous herbal extracts are available, including Andrographis Paniculata (Kalmegh), Asparagus Racemosus (Shatawari), Boswellia serrata (Salai Guggal), Asphalt (Shilajit), and others.

C. NOT TESTED ON ANIMAL

Kalmegh's Andrographis Paniculata However, animal testing is not required for natural cosmetics.

D. NO SIDE EFFECTS

One need not be concerned about them when using natural cosmetics. Since the natural ingredients are safe, they can be applied anywhere, at any time and are thought to disrupt the way hormones work to treat moderately severe to mild acne. The oral medication

isotretinoin (Accutane) is only recommended for really severe, deformity-causing acne.

1.4. PROPERTIES OF FACE WASH

1. The following characteristics are crucial to consider when selecting a face wash:
2. A decent face wash need to be both aesthetically pleasing and stable.
3. When the face wash is applied to the skin, it should become softer and easier to spread.
4. The face wash ought to glide over the skin without dragging or leaving it feeling greasy.
5. The face wash residue shouldn't get thick once the water has evaporated.
6. Rather than absorbing into the skin, the face wash's physical function should be to flush the skin and open pores.
7. After application, a thin emollient layer that keeps the skin moisturized and acts as a protective barrier should still be present.[2]

1.6 ADDITIVES USED IN FACE WASH

A. GELLING AGENT

The substances known as gelling agents will change your water or oil phase into a thicker but not rigid gel. Instead of being stiff, emulsions thickened with gelling agents will be more fluid and mobile. When force is applied, certain of these gels will thin (thixotropic).

B. PRESERVATIVES

Toxins, which are harmful to human health and may even be lethal, are secreted by some of these creatures. Methyl and propyl paraben are two examples.

C. HUMECTANTS

Humectants are hygroscopic substances that are used to keep things moist; they are the opposite of desiccants. They are typically molecules with multiple hydrophilic groups, most commonly hydroxyl groups. By absorbing moisture from the surrounding air, humectants draw water vapor into and/or beneath the surface of the organism or object.[3]

1.7 FUNCTION OF FACE WASH

1. Face wash is a cosmetic face care product used to cleanse the skin.
2. Skin cell renewal reduces stress.
3. Eliminates pollutants, oil, and grime.

TYPES OF FACE WASH

Generally, a face wash suits all skin types however now a day different products are available in market that are formulated to suits different skin types for example: an oily skin face wash is made for people have oily skin conditions and does not contains oils and leaves a thin oily film on the skin. These different types of face washes available in the market include.

1. Oily skin face wash
2. Dry skin face wash
3. Normal skin face wash

1.9 FORMS OF FACE WASH

1. Cream based face wash
2. Gel based face wash
3. Liquid based face wash
4. Face wash in powder form

1. CREAM BASED FACE WASH

Cream-based face washes are thick, creamy, and contain essential moisturizing ingredients like botanical oils. They help you remove any dirt, perspiration, makeup, or bacteria from your skin. Cream-based facewashes are the best for dry skin because they leave the skin free of all impurities without further depleting it of vital natural oils.

2. GEL BASED FACE WASH

Gel facewash is a type of water-based face wash that has a gel-like consistency and is usually created with essential oil and floral extracts. Gel face cleanser that can assist in bringing your skin's pH into equilibrium. For skin types that are sensitive, irritable, or itchy, gel facewash is advised.

3. LIQUID BASED FACE WASH

Face washes with a liquid basis have been popular in pharmaceuticals because of their rapid start of action, great dosage flexibility, and simplicity of ingesting.
They are usually divided into two major groups: monophasic and biphasic formulations. A variety of dose forms fall under these two categories.

4. FACE WASH IN POWDER FORM

Dry formulas known as powder face cleansers react with water to generate foam or washing paste. They frequently include mild exfoliants, such as rice bran or enzymes, to get rid of oil, debris, and dead skin cells without using harsh abrasives. They are well-liked for their consistent, adaptable structure and ease of transport.

They are well-liked because of their consistent, adaptable structure and ease of transport. Usually made of finely ground powder, powder face cleansers are activated by combining it with water to create a cleaning Foam or pasteDue to its adjustable exfoliating strength, powder face washes are frequently preferred by those with sensitive or acne-prone skin. The texture and intensity of the exfoliation may be controlled by the user by varying the amount of water applied. They offer the following advantages.[7]

BENEFITS OF FACE WASH

- By aiding in the elimination of dead skin cells, it maintains skin looking young and healthy.
- Eliminates pollutants, oil, and debris that build up on the skin during the day.
- Removes extra oil and unclogs pores to help stop outbreaks.
- A lot of face cleansers are made with components that support the preservation of the skin's natural moisture equilibrium.

- Exfoliating chemicals included in certain face cleansers aid in the removal of dead skin cells, resulting in a smoother complexion.
- By keeping the skin clean and renewed, regular usage can improve its texture and tone
- Other skincare products, such serums and moisturizers, are better absorbed by a clean face.
- Frequent washing aids in avoiding a number of skin problems, including inflammation, irritation, and dullness.
- You may get an instant sense of renewal and refreshment after washing your face.[11]

COSMETIC AND THERAPEUTIC APPLICATION OF FACE WASH

A good face wash should have several cosmetic qualities, such as preserving the ideal pH, cleaning without irritating the skin, and providing noticeable skin texture improvements.

Herbal face cleansers are used therapeutically to.

1. By lowering microbial colonization
2. Acne can be prevented and controlled.
3. Encourage cellular turnover and exfoliation.
4. Reduce oxidative stress to delay the aging process.[21]

Melanin modification can improve skin tone and clarity. The synergistic interplay of a natural face wash's constituents allows it to have several uses; yet, in order to guarantee user compliance and efficacy, physical characteristics including pH, consistency, spreadability, foamability, and washability must be assessed.[22]

Aloe vera is a major active ingredient in a herbal face wash, and its formulation and assessment are the main goals of this study.

By analyzing the formed product's organoleptic and physicochemical properties, including variables like pH, spreadability, consistency, and foamability, the study also aims to provide a comprehensive assessment.

Furthermore, the study aims to evaluate the face wash's functional effectiveness, paying special attention to its capacity for cleansing, skin compatibility, and general aesthetic appeal. A comparison between the prepared herbal face wash and a commercially available face wash product will be conducted in order to determine the formulation's efficacy and user acceptance.[23]

2. LITERATURE REVIEW

1. A Teke, B Chavan, et.al, (2025)

Because of its perceived safety, effectiveness, and lack of negative side effects, plant-based skincare products have become more popular as a result of consumers growing desire for herbal cosmetics. Aloevera is well-known for its many uses, which include skin-healing, anti-inflammatory, antibacterial, and hydrating qualities. The goal of the face wash's development was to offer a mild, natural, and efficient skincare product that would work for all skin types. Herbal ingredients were carefully mixed during the formulation process, and then important characteristics like color, odor, pH, consistency, spreadability, washability, and foamability were assessed.

2. Shreya Kamavaram, Sanjay K. Bais, et.al., (2024)

Because herbal cosmetics are thought to be safe and effective, demand for them has increased recently. The purpose of this study is to create and assess a herbal face wash with extracts from Bel patra which are known for their therapeutic qualities. Bel patra is a perfect ingredient for skin care products because it is high in antibacterial, anti-inflammatory, and antioxidant compounds. Bel patra leaf active ingredients were extracted as part of the formulation process, and these extracts were then added to a face wash base. To find the ideal formulation in terms of texture, foaming capability, pH, and stability, different extract concentrations were investigated.

3. ASehgal, M Banyal, et.al., (2023)

Natural medications are more widely accepted due to the belief that they are less harmful and safer than manufactured ones. In the global market, herbal formulations are in high demand. As natural anti-acne face wash, the current study prepared and tested aqueous extracts of neem leaves (Azadirachta indica), turmeric (Curcuma longa), aloe vera, lemon juice, peppermint oil, xantham gum, and rose water. Wead vise creating a pure herbal formulation devoid of any synthetic chemicals, even if there are a number of topical herbal therapies for acne available on the market. According to published data, the plants have good antimicrobial, antioxidant, and anti-inflammatory qualities. Different amounts of xantham gum were utilized to make the various formulation batches, F1through F3. The manufactured formulations (F1 through F3) were assessed according to several standards, such as color, consistency, pH, washability, and spreadability.

4. Miss. Mane Ashwini Ganpat1, Prof. Aswar A.R.2, et.al., (2022)

Finding and assessing the physicochemical characteristics of snow mushroom (Tremella fuciformis) face wash as well as determining the acceptability of the extract facial wash with the best physicochemical characteristics were the objectives of this study.UAE (Ultrasound-Assisted Extraction) and ethanol were employed as solvents in this work to extract snow mushrooms (Tremella fuciformis) at different concentrations: 96% (F1), 75% (F2), and 50% (F3). Additionally, the extract's physicochemical properties will beassessed when it is manufactured into a facewash. Physicochemical characteristics include density, viscosity, spreadability, foamability, pH, and organoleptic properties. The organoleptic compositionof the face wash was not significantly impacted by the variation in ethanol concentration as menstruum of snow

fungus (Tremella fuciformis) extraction. However, the physicochemical properties of the face wash were affected; higher ethanol concentrations led to lower pH, higher density and viscosity, smaller spreadability, and foamability that complied with specifications. The study of physicochemical features revealed that F1 had the best specifications. Hedonic testing was then conducted to as certain the acceptability of the facial wash made from snow mushroom (Tremella fuciformis) extract. The hedonic test findings on F1 demonstrated adequate acceptability with respect to the parameters of aroma and viscosity, as well as good acceptance with regard to the criteria of appearance, foam, and effects following the use of facial wash

5. NitinYadav, Shashikant Maury, et.al., (2021)

Ordinary soaps cause the delicate skin of the face to become dry and lose its suppleness. Facewash is a gentle cleanser that doesn't cause skin irritation. Facewash is intended to cleanse, moisturize, prevent wrinkles and acne, and improve skin fairness, making the skin appear youthful and vibrant. The current facewashes on the market are gel and cream varieties, which should be packaged in large collapsible tubes or plastic containers to make them easy for consumers to carryon trips. Additionally, because these facewashes are aqueous, they require a preservative to keep their stability. The current project aims to create herbal face wash tablets and address the short comings of synthetic face washes.

6. Dnyaneshwar S.Solanki, Prof. Suraj Dattatray Sagrule et.al., (2020)

Creating and testing a cosmetic Instant Whitening Face wash with natural ingredients is the aim of this project. People have been aware of the usage of plants for the basic requirements of having attractive, healthy skin since ancient times. Products for cleaning, beautifying, and promoting an attractive appearance are called cosmetics. Cosmetics made with natural ingredients, including herbs, have been shown to be highly effective in meeting the current needs of various skin types. The use of chemicals, concoctions, or physical procedures to lighten skin tone is known as skin whitening. Skin whitening procedures function by lowering the skin's melanin concentration. Numerous substances have demonstrated efficacy in skin white while antioxidants active in the oxidative stress of skin aging cells may improve skin health, herbs can alter the metabolism of pigmentation for human skin color and serve a critical protective role in skin whitening.

7. Khushi Shah N, G. Raghavendra Rao, et.al., (2019)

A face wash is a washing solution for the face that removes makeup, dead skin cells, oil, waste, and dirt. This cleanses the pores and helps avoid skin issues like acne. The current study set out to manufacture and produce a poly herbal face wash that contains periwinkle and basil extracts to cleanse and balance the skin while treating it with a mild and gentle touch. Antioxidant alkaloids are abundant in the periwinkle extract. This extract is commonly used in skin-brightening cosmetics to increase radiant energy. Basil's antibacterial and anti-inflammatory properties help prevent acne. Basil is also an excellent pore cleanser since it contains natural oils that act as a natural cleaner and aid in the removal of impurities and excess oil. It also calms and relieves edema, acne-related discomfort, and skin irritation. After a comprehensive evaluation of numerous factors, including color, pH, consistency, washability, and irritation, the current study found that the herbal facewash formulation was more effective. Herbal formulations are becoming more and more in demand on the global market. This blend is reliable and safe for skin because all of its ingredients are herbal.

8. Mayur N. Ghotkar, Shubham S.Kharade, et.al., (2018)

With synthetic issues, it is more acceptable to think that natural solutions are safer than those with less negative effects. The combination of herbs is driving up demand in the global industry.

Work in progress the creation and testing of flammable extracts with facial spray that contain tulsi (Ocimum Sanctum) leaf extract, turmeric (curcuma longa) hydroalcoholic extract, black pepper, orange peel, and nutmeg (myristic scent) is known as herbal anti-acne. We suggest creating pure herbal formulations without the use of artificial ingredients, despite the fact that there are certain particular local herbal formulas on the market. The plants' antimicrobial, anti-oxidant, and anti-inflammatory properties have been documented in the literature. Xanthum gum was used to develop a number of formulations from batches F1 through F5 in various situations. Evaluations were conducted on color, appearance, stability, fraud, pH, and consistency for several formulations that were created (F1 toF5). Comparison with the creation of tradable lots on the market. Out of all the formulation studies, lot F2 was the best for every metric.

9. Poonam Ankush Jadhav, et.al., (2017)

Because they are thought to be safer and have fewer negative effects, natural therapies are more widely accepted. Herbal medicines have long been used for societal well-being, not just in Asian nation's butal so globally. The creation and assessment of an herbal extract of Bel patra (Bilva) and curry leaf (Murraya koenigii) are the subjects of the current study. According to published reports, these plants possess antibacterial, antioxidant, anti-inflammatory, and anti-diabetic properties. Polymers in different Concentrations were used to make the different formulation batches, or F1 through F6. The prepared formulas were tested for a number of criteria, and batch F1 and batch F2 were determined to be the best for every parameter.

10. Palash Mandal, Ravi Kumar, et.al., (2015)

These days, acne is a widespread disorder that is caused

by hormonal fluctuations. The primary damaged areas are the face and neck. Eliminating oil from the face is part of preventive measures. For this reason, proper washing and cleaning are necessary. Numerous studies have demonstrated the effectiveness of herbal-based cleaning solutions that also eliminate excess oil; in light of this, the goal of the current project was to create a face wash gel with antibacterial and antioxidant qualities. A number of quality control measures, including spreadability, pH, consistency, and grittiness, were assessed for the prepared gel. The quality control parameters yielded satisfactory results.

11. M Gharate, V Kasture, et.al., (2013)

An Ayurvedic liquid medication form called Punarna vasava, which contains self-generated alcohol, is frequently used to treat edema and inflammatory diseases. In this investigation, we assessed the anti-inflammatory, analgesic, antipyretic, and antiulcer properties of three distinct Punarnavasava brands. Ratpawedema caused by carrageenan, granuloma caused by cotton pellets, paw licking caused by formalin, yeast-induced hyperpyrexia, and pyloric ligated ulcers were all markedly reduced by the formulation. According to the study's findings, punarna vasava exhibits anti-inflammatory, antipyretic, antiulcer, and central and peripheral antinociceptive properties, which supports its application in inflammatory disorders.

12. Mohammad Khalid, H.H. Siddiqui, et.al., (2012)

The herbaceous spreading vine Boerhaavia diffusa L. (Nyctaginaceae) is found throughout the world's tropical and subtropical climates. The plants are abundant in protein, carbohydrates, minerals, and vitamins. The medication works well for eye conditions in the Punjab region and for dropsical swellings in Bombay. The root is typically used in infusion for internal inflammation, as a laxative, and for urinary diseases, while the leaf juice is used for jaundice. The extract from the entire plant has hepatoprotective properties. Numerous characteristics were examined, including extraction value, quantitative phytochemical screening of various extractives, macroscopy, microscopy, and fluorescence analysis. The main constituents of the extracts, such as total flavonoids and total phenolic, were also evaluated. The principal elements of the extractives such as total flavonoids and total phenolic were also assessed. The features of quantitative, physicochemical, fluorescent, and microscopy as a mean, chemical screening was done on the plant material's root extractives of verification.

3. AIM AND OBJECTIVES

AIM

The aim of research was to formulate and evaluate the Herbal face wash using plant extract of boerhavia diffusa that may have the major useful parameters.

OBJECTIVES

This study evaluates the phytochemical, preformulation and post formulation screening of plant extract boerhavia diffusa Boerhavia diffusa have the anti acne, anti inflammatory, anti bacterial, and antioxidant property.

4. PLAN OF WORK

Collection and authentication of plant

↓

Drying of plant under shade and then grind to make a powder

↓

Extraction of plant material by using soxhlet apparatus

↓

Phytochemical evaluation of Boerhavia diffusa
Evaluation of pre formulation and post formulation

↓

Antibacterial, antioxidant, antiacne, antiinflammatory

↓

Result and discussion

↓

Conclusion

5. PLANT PROFILE

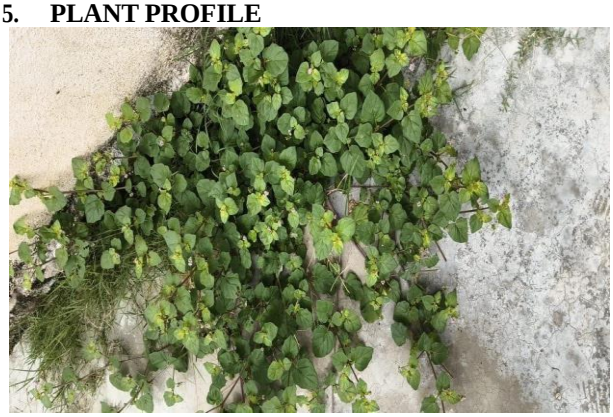

Figure: 01.

Synonyms

Boerhavia diffusa is also known by various synonyms such as.

- Boerhavia adscendens
- Axiscoccinea
- Boerhavia paniculata
- Boerhavia coccinea
- Boerhavia laxa

- **Taxonomical Classification**
- Taxonomical classification of Boerhavia diffusa

➢ **Table1.**

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida class
Order	Caryophyllales
Family	Nyctaginaceae
Genus	Boerhavia
Species	Diffusa

➢ **Common Names**
➢ Different vernacular names of Boerhavia diffusa

➢ **Table 2.**

Languages	**Common Names**
English	Hogweed
Hind	Santh
Sanskrit	Punarnava
Tamil	Mukarattekirai
Malayalam	Chuvanana
Kannada	Sanadika

ORIGIN AND DISTRIBUTION
Boerhavia diffusa originated in the Indian subcontinent and Brazil. It has also been documented across the tropics, subtropics, and temperate zones. It also found in Africa, China, Australia, and widely spreaded in India, Kenya, Tanzania.

ECOLOGY
Boerhavia diffusa has a broad ecology, being a pan tropical plant that thrives in a variety of conditions, especially in rural (disturbed) habitats likes road sides, pastures and waste lands. It tolerates poor, sandy, or stony soils, and can handle both dry and semi-arid climates .The plant is a sun loving herb and often considered as a weed in cultivated area. They can reproduce both sexually (seed) and asexually (fragmentation).

PROPAGATION
Boerhavia diffusa can be propagated through seeds or stem cuttings for home growing, but for rapid, large-scale production, invitro micro propagation is used. For cuttings, take healthy stem cutting and plant it in moist soil, keeping it consistently moist until roots establish. For micro propagation, nodular shoot-tip explants are cultured on a nutrient medium with plant hormones likes BAP and IBA to induce multiple shoots.

TRADITIONAL USES
Boerhavia diffusa plant that has been traditionally used in the treatment of many disease. It includes such as,

✓ Treat jaundice
✓ Treat liver problems
✓ Purifying blood
✓ Diuretics
✓ Pain relief
✓ Antidote
✓ Hepatoprotective
✓ Reno protective
✓ Immunomodulatory
✓ Antidiabetic
✓ Anticancer
✓ Antioxidant
✓ Anti-inflamma

MORPHOLOGICAL CHARACTRES
It is a creeping perennial herb with diffusely branched, 30–100 cm stem height, cylindrical, slender, greenish–purple in colour, often swollen at the nodes.

QUALITATIVE PHYTOCHEMICAL SCREENING
Alkaloid, Flavonoids, Saponins, Terpinoids, Phenols, Steroids, Cardiac glycosides, Reducing sugars and Tannins were screened on the different parts of the plants such as leaves, roots and stem.

NUTRITIONAL COMPOSITION
Boerhavia diffusa leaves are the source of moisture, carbohydrates, and vitamin C, and contain minerals like Calcium, Iron, and Magnesium.

Fresh leaves contain high amount of moisture, while dry matter analysis reveals higher concentration of proteins and fibers.

Table-3: Nutritional composition.

Constituent	**Quantity per 100gm**
Moisture	76%-88%
Carbohydrate	17.14%(fresh)
Protein	~1.45%(dry matter)
Fat	~1.122%(dry matter)
Crude fiber	~0.97%(dry matter)
Energy	~38Kcal(dry matter)
Vitamin C	~38-40mg(fresh)
Calcium	~218-250mg
Iron	~20-74mg
Magnesium	~8.7-143mg
Sodium	~160-162mg
Potassium	~88-151mg
Zinc and Manganese	Smaller amount
Phosphorus	~151mg

6. METHODS AND MATERIALS

MATERIALS

- Boerhavia diffusa extract
- Aloevera gel
- Honey
- Lemon juice
- Glycerin
- Xanthan gum
- Rosewater
- Methyl paraben
- Sodium lauryl sulfate
- Benedict's reagent
- Million's reagent
- Sodium bicarbonate
- Ferrous sulphate

- Sulfuric acid

INSTRUMENT

- Soxhlet apparatus
- Digital pH
- Water bath
- UV Spectrometer
- TLC

PLANTS MATERIALS

In this present studies, Boerhavia diffusa was selected because, it is for considered anti-acne, anti –oxidant, anti-inflammatory, anti-bacterial.

COLLECTION OF PLANT MATREIAL

The fresh Boerhavia diffusa whole plant was collected from Tirupattur, Tamil Nadu.

PREPARATION OF EXTRACT

1. PREPARATION OF BOERHAVIA DIFFUSA EXTRACT

Cleaning and drying

Thoroughly clean the collected plant material to remove any dirt or debris. Allow it to air drying shaded area to prevent degradation of active compounds alternatively. You can use a food dehydrator or an oven set to a low temperature for drying.

Figure: 02.

Grinding or Crushing

Once dried, grind the plant material into a coarse powder using a mortar and pestle or an electric grinder. Ensure that the powder is uniform in texture to facilitate extraction.

Extraction

There are various methods for extracting bioactive compounds from plant material.

Common extraction method includes

Ethanol Extraction

The solid powdered plant material is placed in the sox thimble, the ethanolic solvent was used for this extraction. The 70% of ethanolic solvent was placed in the round bottom flask and the solvent is heated under the reflex by using heating mantle under the controlled temperature. Seal the container and let it soak for a specified period, with occasional shaking or stirring after extraction, filter the mixture to remove solid particles, and then evaporate the ethanol under reduced pressure using a rotary evaporator or by air-drying to obtain the crude extract.

Concentration and drying

Once the extraction is complete, concentrate the extract using a rotary evaporator or by air-drying. The resulting concentrated extract was there stored in a cool, dry place for further use.

Quality control

Performed appropriate quality control tests to assess the phytochemical composition, purity and potency of the extract. This includes assays for specific bioactive compounds, such as flavonoids, alkaloids, or phenolic compounds, as well as tests for contaminants.

Figure: 03.

Standardization

Standardizes the extract to ensure consistency in its composition and therapeutic effects. The involved adjusting the extraction parameters or adding standardized markers for quantification. It is important to note that the specific extraction method and conditions vary depending on the desired phytochemicals and intended use of the extract. Additionally, I ensured compliance with ethical and legal guidelines regarding the collection and use of plant material.

2. YIELD AND COLOR DETERMINATION

The color of the extract was observed visually. The

yield of the extract was calculated using the following.

Formula:

% yield = (weight of the extract \ weight of powder taken) *10

PREPARATION OF ALOEVERA GEL

Mature, healthy and fresh aloevera leaves were collected and washed with distilled water.

Then after proper drying of leaves in hot air oven, the outer part of the leaf was dissected longitudinally using a sterile knife.

Then the aloevera gel that is the colour less parenchymatous tissue was removed using the sterile knife.

Then it is filtered using muslin cloth to remove the fibers and impurities.

Then the filtrate or the filter product which is a clear aloevera gel was used in the preparation.

PREPARATION OF HERBAL FACE WASH

First add required quantity of xanthan gum put in rose water for overnight in a beaker. In second beaker, aloevera gel, glycerin, honey and few drops of lemon juice mix it. Transfer second beaker mixture (aloe vera gel+ glycerin+ honey+ few drops of Lemon juice) into rose water mixture (xanthan gum+ rose water) Mix the two, mixtures are together. Then add the neem extract and turmeric extract to above mixture, Mix it properly, finally add sodium lauryl sulfate to the above mixture. Mix it properly to make viscous Herbal Face Wash.

COMPOSITION OF HERBAL FACE WASH

S.NO	NAME OF DRUG	F1	F2	F3	USES
1.	Boerhavia diffusa extract	4ml	4.5ml	3ml	Anti-bacterial, anti- acne, anti-oxidant, anti-inflammatory
2.	Aloevera gel	5gm	6gm	5gm	Anti-pigmentation properties
3.	Honey	3ml	5ml	3ml	Anti-oxidant and Nourishing agent
4.	Lemon juice	5drops	6drops	6drops	Natural cleanser and PH adjuste
5.	Glycerin	5ml	5ml	4ml	Moisturizer
6.	Xanthan gum	0.25gm	2gm	2gm	Thickening agent and stabilizer
7.	Rosewater	100ml	100ml	100ml	Cooling and flavoring agent
8.	Methyl paraben	0.02gm	0.02gm	0.02gm	Preservatives
9.	Sodium lauryl sulphate	2gm	2gm	2gm	Foaming agent

Figure: 04.

PERFORMULATION STUDY OF RAW MATERIALS

1) PHYTOCHEMICAL SCREENING OF CONSTITUENTS

TEST	PROCEDURE	OBSERVATION
Carbohydrate	**Benedict's test**: little amount of filtrate + benedictc's reagent (5ml) heated on water bath for few minutes	Appearance of red orange ppt, indicates presence of carbohydrates
Proteins	**Millions test :**To 2ml of filtrate few drops of million's reagent are added. The result was observed	A white ppt indicates presence of proteins
Vitamins	**Test for vitamins :**To 2ml of 2% w/v solution add 2ml of water .1 gm of sodium bicarbonate and about 20 mg of ferrous sulphate, shake and allow to stand a deep violate colour is produced add 5ml of sulphuric acid	The colour disappears indicates positive test
Alkaloids	**Mayer's test :** To 1ml of filtrate, few drops of mayer"s reagent is added by side of the test tube.	The white or creamy precipitate It indicates test as positive
Phenolic compounds	**Leadacetatesolution:**To2-3ml of aqueous extract add few drops of lead acetate solution.	A white ppt indicate presence of phenolic compounds
Tannins	**Ferric chloride:** Test solution+5%ferricchloride solution (few drops)	Blue- black/ green-black colour indicates presence of tannins
Flavonoids	**Alkaline reagent test:** Test solution + NaOH (few drops)	Deep yellow colour indicates presence of flavonoids

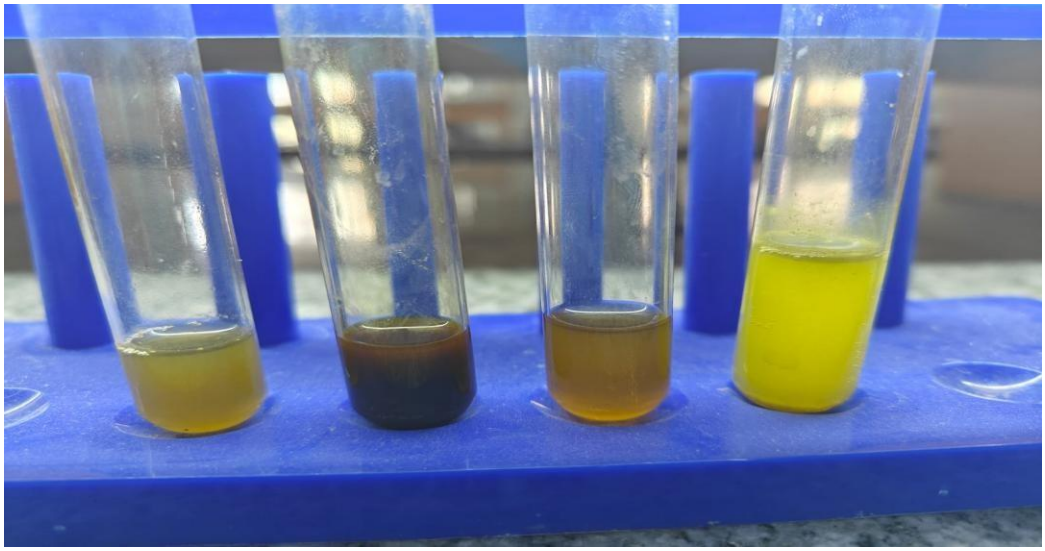

Figure: 05

2) DETERMINATION OF TOTAL ASH

Useful for detecting low grade products useful for detecting exhausted products, useful for detecting excess of sandy useful for detecting earthy matter with drug.

Weigh accurately about 2-3gm of the powdered drug in a tardsilics crucible. Incinerate the powdered rugby gradually increasing the temperature 550C until free from carbon and cool. keep it in dessiccator. Weigh the ash and calculate the % of the ash wit reference to the air dried sample.

FORMULA: % Total ash = Ash weight
Weight of sample*100

3) WATER SOLUBLE TEST

To the crucible containing the total ash, add 25 ml of water and boil for minutes. Collect the insoluble matter in a silica crucible or on the ash less filter-paper. Wash with hot water igniteina crucible for 15 minutes at a temperature not exceeding 450 C.subtract the weight of this residue in mg from the weight of total ash. Calculate the content of water- soluble ash in mg per g of air – dried material**.**

FORMULA
% Water soluble ash= total ash weight–water insoluble residue into talash*100
Weight of sample

4) SOLUBILITY TEST

As adding solute for solubility analysis in small incremental amount to fixed the volume of solvents such as ethanol, acetone, and chloroform. After undissolved particles will be examined**.**

5) UV SPCTROSCOPY METHOD

Calibration curve of boerhavia diffusa extract was

prepared in distilled water at maximum wavelength of 281 nm distilled water was used for the preparation of calibration curve. 1ml of crude extract was dissolved in 100 ml of distilled water that is treated s stock solution. This stock solution was diluted to get different concentrations. Final solution was scanned for lamda maximum. in the range of 200 – 400 nm using uv spectrometers.

6) THIN LAYER CHROMATOGRAHY (TLC)

Prepare the slurry (5gm of silica gel G in 12.5ml of water) then slurry spreaded in TLC plate. Then coated plate was placed in air for 30 min and then in hot air oven at 100C for 30min.mobile phase (ethanol) suitable solvent poured in TLC chamber and close the chamber leave it for some time. Then placed TLC plate on the TLC chamber after solvent front gets to top of plate then remove TLC plate and position of solvent as marked, then plate placed in hot air oven at 100C for 30 min. then dilute sample solution should applied on TLC plate by using capillary tube and place TLC plate when sample spot was obtained then remove TLC plate. Then measure the distance travelled solvent and the distance travelled by the spot. Calculate the RF value.

FORMULA

RF Value =Distance travelled by component
Distance traveled by solvent

EVALUATION PARAMETERS OF FORMULATION

- **COLOUR EXAMINATION**
  - 5ml of prepared face wash was taken on a watch glass.
  - Colour was observed by naked eye.

- **ODOUR EXAMINATION**
  - 2ml of prepared face wash was taken and smelled.
  - Then odour was observed.

- **PH EXAMINATION**
  - Washed the glass electrode with distilled water and cleaned.
  - Placed the electrode in PH 7 buffer solution and set the value of 7 on the PH meter turning the calibrate knob on the meter.
  - Removed the electrode and washed with distilled water and cleaned.
  - Then placed electrode in the PH 4 buffer solution. Adjust the value.
  - Then electrode was placed in the final face wash and PH was observed.

- **WASHABILITE**
  - Formulation was applied on the skin and then ease and extent was washing with water were checked manually.

- **SPREADABILITE**
  - Spreadability notes the extent of area to which the gel readily spread on the application to skin or the affected part. The bioavailability efficiency of a gel formulation also depends on its spreading value.

- **IRRITANCY TEST**
  - Mark an area (1sq.cm) on the left hand dorsal surface. Definite quantities was prepared face pack were applied to the specified area and time was noted. Irritancy, Erythematic, Edema, was checked if any for regular intervals of time.

- **STABILITY STUDIES**
  - Stability testing of prepared formulation was conducted by storing at different temperature condition for the period of 72 hrs. The packed glass vials of formulation stored at different temperature and were evaluated for physical parameter like colour, odor, PH, consistency and feel.

- **FOAMABILITY TEST**
  - Small amount of face wash will be taken in a beaker containing water. Initial volume will be noted beaker will be shaken for 10 minutes and the final volume will be noted, foam appears 1.5cm.

6. RESULT AND DISCUSSION

Results

Phytochemical evaluation

Table 04: phytochemical test for boerhavia diffusa.

PHYTOCHEMICAL	STATUS
Carbohydrates	+
Proteins	+
Vitamins	+
Alkaloids	-
Phenolic compound	+
Tannins	+
Flavonoids	+

+ = Presence of phytochemicals

- = Absence of phytochemicals

CONCLUSION

The present study on the formulation and evaluation of a herbal face wash containing ethanolic extract of Boerhavia diffusa demonstrates the potential of natural plant-based ingredients in developing safe and effective skincare products. The ethanolic extraction method proved efficient in isolating the active phytoconstituents responsible for antioxidant, anti-inflammatory, and antimicrobial activities.

The formulated herbal face wash exhibited satisfactory physicochemical properties, including appropriate pH, good foaming ability, cleansing action, stability, and homogeneity, making it suitable for regular topical use. Evaluation studies indicated that the formulation is non-irritant, skin-friendly, and effective in removing impurities without causing dryness or damage to the skin.

The presence of bioactive compounds in Boerhavia

diffusa supports its role in managing common skin conditions such as acne, irritation, and microbial infections. Overall, the study confirms that Boerhavia diffusa extract can be successfully incorporated into herbal face wash formulations, offering a natural and beneficial alternative to synthetic cosmetic products.

Further research involving clinical trials and long-term stability studies is recommended to validate its efficacy and ensure its commercial applicability.

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